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Revision 2
October 11, 2002

System Design Criteria for the OU 7-10 Glovebox Excavator Method Project

Facility and Infrastructure Design Criteria

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Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC

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Idaho National Engineering and Environmental Laboratory
Environmental Restoration Program
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
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CONTENTS

ACRONYMS

D&D&D	deactivation, decontamination, and decommissioning
DBE	design-basis earthquake
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
ERDA	Energy Research and Development Administration
H&V	heating and ventilating
HEPA	high-efficiency particulate air
IESNA	Illuminating Engineering Society of North America
INEEL	Idaho National Engineering and Environmental Laboratory
MCP	management control procedure
NFPA	National Fire Protection Association
OU	operable unit
PDSA	preliminary documented safety analysis
PGS	Packaging Glovebox System
RCS	Retrieval Confinement Structure
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SDC	system design criteria
SSC	system, structure, or component
TFR	technical and functional requirement
WAG	Waste Area Group
WES	Weather Enclosure Structure

System Design Criteria
for the OU 7-10 Glovebox Excavator Method Project

Facility and Infrastructure Design Criteria

1. INTRODUCTION

This system design criteria (SDC) document establishes the design criteria for the facility and infrastructure for the OU 7-10 Glovebox Excavator Method Project. It is intended to augment the parent document (i.e., *OU 7-10 Glovebox Excavator Method Project Technical and Functional Requirements* [INEEL 2002a]) sufficiently to enable the performance of the OU 7-10 Glovebox Excavator Method Project detailed design, engineering, and evaluation activities.

The *Record of Decision: Declaration of Pit 9 at the Radioactive Waste Management Complex Subsurface Disposal Area at the Idaho National Engineering Laboratory, Idaho Falls, Idaho* (DOE-ID 1993) specifies the environmental remediation of transuranic (TRU) waste from OU 7-10 (which comprises Pit 9) of Waste Area Group (WAG) 7. On October 1, 2001, the Idaho National Engineering and Environmental Laboratory (INEEL) published the *WAG 7 Analysis of OU 7-10 Stage II Modifications Report* (INEEL 2001), which identified a feasible approach for retrieving waste from OU 7-10. The project was established to accomplish the objectives presented in that report. The overall objectives for the project are as follows:

- Demonstrate waste zone material retrieval
- Provide information on any contaminants of concern present in the underburden
- Characterize waste zone material for safe and compliant storage
- Package and store waste onsite, pending decision on final disposition.

This project was requested by the U.S. Department of Energy Idaho Operations Office (DOE-ID) in support of the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991), OU 7-10 Record of Decision (DOE-ID 1993), *Explanation of Significant Differences for the Pit 9 Interim Action Record of Decision at the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 1998), and Appendix A of the *Remedial Design/Remedial Action Scope of Work and Remedial Design Work Plan: Operable Unit OU 7-10 (Pit 9 Project Interim Action)* (LMITCO 1997).

1.1 Facility Description

The INEEL is a U.S. Department of Energy (DOE) facility, located 52 km (32 mi) west of Idaho Falls, Idaho, and occupies 2,305 km^2 (890 mi^2) of the northeastern portion of the Eastern Idaho Snake River Plain. The Radioactive Waste Management Complex (RWMC) is located in the southwestern portion of the INEEL. The Subsurface Disposal Area (SDA) is a 39-ha (97-acre) area located in the RWMC. Waste Area Group 7 is the designation recognized by Comprehensive Environmental Response, Compensation and Liability Act (42 USC § 9601 et seq.) and in the Federal Facility Agreement and

Consent Order for the RWMC, which comprises the SDA buried waste site. Waste Area Group 7 was divided into 13 OUs[a]. Operable Unit 7-10 is located in the northeast corner of the SDA. The OU 7-10 site is an area in which chemicals, radioactive materials, and sludge from DOE weapons plants and other government programs were disposed. While such disposal at the RWMC began in 1952, OU 7-10 was used and filled in the late 1960s. The pit contains characteristic hazardous, listed hazardous, low-level radioactive, and transuranic waste.

The project facilities and processes are being designed to safely conduct a waste zone material retrieval demonstration in a selected area of OU 7-10. The project processes consist of excavation and retrieval; sampling, packaging, and interim storage; shutdown; deactivation, decontamination, and decommissioning (D&D&D); and environmental monitoring. Project facilities include a Weather Enclosure Structure (WES), Retrieval Confinement Structure (RCS), excavator, ventilation system, and other supporting equipment. The packaged material will be stored onsite, pending decision on final disposition.

1.2 Limitations of the System Design Criteria

This SDC document defines the criteria for the facility and infrastructure aspects of the project. The SDC flow directly from the aforementioned Technical and Functional Requirements (TFR) document, and are intended to include detail not provided in the TFR document, client requirements, and those codes, standards, and regulations that will be used as a basis for the design of the facilities and infrastructure systems. Design criteria will be revised as the project proceeds.

This SDC document focuses only on the facility and infrastructure design criteria. The SDCs for general site, process, excavation, packaging, fire protection, and instrumentation and control are addressed in separate documents.

1.3 Ownership of the System Design Criteria

This SDC document is the product of the combined activities of the project team. The project engineer has the ultimate responsibility for the content and approval of this document.

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a. Operable Units 13 and 14 were combined in the 1995 comprehensive remedial investigation and feasibility (Huntley and Burns 1995).

2. OVERVIEW

2.1 Facility Structure, System, Component Functions

The facility, structures, systems and components included in these criteria are the mechanical and electrical systems and components located within the WES. Architectural criteria for support buildings are also included here.

2.2 Facility Structure, System, and Component Classification

No safety-class structures, systems, or components (SSCs) are associated with this project.

The *Preliminary Documented Safety Analysis for the Operable Unit 7-10 Glovebox Excavator Method* (INEEL 2002b) provides a description of the facility safety basis and identifies its safety-significant design features. It prescribes minimum design criteria and functional requirements for the project to follow. The ventilation system up to and including the high-efficiency particulate air (HEPA) filters, as well as the relief damper with actuators and the Packaging Glovebox System (PGS) inlet HEPA filter, are the only components of the facilities and infrastructure system that are safety significant. Appendix A describes the critical attributes of these safety-significant components.

2.3 Operational Overview

The project includes systems to support retrieval and packaging of waste zone material. The site where the facilities will be located has 6-in. diameter probes that were installed to refusal during Stage I of the OU 7-10 Staged Interim Action Project. These probes may be moved during the waste zone material retrieval to facilitate retrieval and underburden sampling operations.

Waste zone material will be retrieved with a manned excavator. The operator will be located in the WES outside the RCS. The excavator arm, contained within RCS, will excavate an angular swath. The retrieved material in the excavator bucket then will be placed in a transfer cart. One transfer cart will be located at the entrance of each of the three material packaging gloveboxes. The carts transport waste zone material into the gloveboxes, where it will be inspected, sampled, and packaged. Packaged waste will then be assayed to determine total fissile mass. The waste will then be stored onsite, pending decision on final disposition.

After waste zone material excavation is complete and samples of the underburden are taken, the pit will be backfilled for closure before the D&D&D phase.

3. DESIGN CRITERIA AND BASES

This section provides criteria required for the analysis and design of the project facilities necessary to support the project processes, structures, and activities. This includes architectural features, office and storage areas, and support trailers.

The facility systems include but are not limited to the heating system, HEPA filtered ventilation systems, dust contamination control system (which include the water supply and compressed air supply), electrical power systems, and breathing air system.

3.1 General Facility

All facilities shall be designed to comply with applicable DOE-ID "Architectural Engineering Standards." The general building code for structures in this facility will be the "International Building Code" (ICC 2000).

3.1.1 Operational Design Criteria

This section contains the operational design criteria for the general facility. These operational design criteria are applicable to all facility subsystems identified in this section, in addition to those that are listed specifically in the subsections:

1. Facilities housing support functions shall include space to facilitate personnel staff requirements (e.g., administrative office space, conference area, break and lunch room accommodations).

   Basis: DOE-ID "Architectural Engineering Standards," Section 0100. Personnel must be provided a safe and healthy work environment. Offices, lunchrooms, showers, and locker rooms will not be provided as part of the new structures. No permanent change room facilities will be constructed; however, facilities will be provided as required by the health and safety plan. Emergency support areas will be available. TFR Section 3.2.6-2.

2. Provide a minimum of two independent exits from the RCS and the WES with separate pathways to minimize the possibility of blocking travel or requiring travel through a high hazard area during an emergency.

   Basis: 29 CFR 1910 Sections 36(b)(8) and 37(f). TFR Section 3.2.4-1.

3. Egress provisions shall comply with National Fire Protection Association (NFPA) 101, "Life Safety Code" requirements.

   Basis: DOE-ID "Architectural Engineering Standards" Section 13, "Special Facilities," and NFPA 101, "Life Safety Code." TFR Section 3.2.4-1.

4. Office space (outside of the WES) allowances shall be provided for 27 personnel per shift.

   Basis: DRAFT, "Manloading Estimate," November 29, 2001, identifies operational personnel and space needs. Interface and contact with Infrastructure and RWMC Maintenance and Planning identified facilities to accommodate the space needs.[b] Offices, lunchrooms, showers, and locker rooms will not be provided as part of the new structures. TFR Section 3.2.6-2.

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b. Dianne Nishioka e-mail to Tim Beseris, INEEL, "Accommodation of Space Needs," February 27, 2002.

5. The WES shall be insulated to R-10 walls and R-14 roof.

Basis: Engineering judgement based upon the temporary nature of the project. The project is required to maintain temperatures that allow normal equipment operation. Temperature in the facility must not fall below a point where equipment will fail to operate. All equipment will operate satisfactorily if the comfort zone temperatures required by Section 1550 of the DOE-ID "Architectural Engineering Standards" are met. TFR Section 3.2.6-4.

6. Project building layout and occupancy classifications shall be as indicated in EDF-2082.

Basis: EDF-2082, "Occupancy and Life Safety Code Analysis."

7. The project shall provide outside storage for fifty 4 × 4 × 4-ft soil sacks.

Basis: The project is required to store overburden removed from OU 7-10 pending final disposition. Several disposition potentials exist depending on the results of characterization analysis. Overburden soil removed to a mutually agreed upon depth may be returned to the excavation. EDF-3125, "Process Calculations." TFR Sections 3.1.2.5-1, 3.1.2.5-2, and 3.1.2.5-3.

8. The hazardous nature of the activities and contents of the WES precludes accommodating the disabled.

Basis: The hazardous nature of the project activities precludes access for the physically disabled.

9. Controlled access to the RCS shall be required.

Basis: As low as reasonably achievable. Access during waste retrieval activities is allowed into the RCS for nonroutine activities only. It is anticipated that access into the PGS will not be possible. TFR Sections 3.2.2-1 and 3.3.1-2.

10. Waste drums within the WES shall be located a minimum of 20 ft from the excavator fuel containment area.

Basis: Per PLN-1024, *Risk Management Plan for the OU 7-10 Glovebox Excavator Method Project*, there is a significant risk of fire exposure causing a breach of confinement area and involves waste zone material or lag storage waste containers outside the confinementstructure. Risk of personnel exposure exists. Work would be delayed until investigations could be completed, corrective actions incorporated, and facility decontamination and repair are completed. As part of the effort to reduce the probability of such events occurring, an administrative control requiring a minimum of 20 ft physical separation between the excavator fuel containment system and lag storage has been imposed. T&FR Section 3.3.7-1.

11. Design shall incorporate the requirements of the *Fire Hazards Analysis for the OU 7-10 Glovebox Excavator Method* (Gosswiller 2002).

Basis: Fire Hazards Analysis (Gosswiller 2002). DOE Order 420.1, "Facility Safety"; and NFPA 801-1998, "Standard for Fire Protection for Facilities Handling Radioactive

Basis: Materials." The design must consider the operational aspects of the facility and their associated fire hazard and incorporate proper controls through sound engineering practice to minimize the potential for fire occurrences. TFR Sections 3.3.7-1, 3.3.7-2, 3.3.7-3, and 3.3.7-4.

12. The facility and infrastructure components that may come in contact with hazardous and radioactive waste encountered during excavation and packaging operations shall be compatible with such hazardous and radioactive waste.

    Basis: To ensure reliability of the facility and infrastructure components. Reactions with hazardous and radioactive waste material may cause corrosion and general deterioration. Information regarding compatibility with the radioactive and hazardous waste can be located in EDF-2041 and EDF-ER-211.

13. The facility and infrastructure system shall have security locks on gates and buildings to preclude unauthorized entrance to the area or operations.

    Basis: Management Control Procedure (MCP) -303, "INEEL Access Controls." TFR Section 3.5.1-5.

14. The facility and infrastructure system shall provide lockable storage for a minimum of a three days of video tape recordings of glovebox operations.

    Basis: Per PLN-632, "Operable Unit (OU) 7-10 Staged Interim Action (SIA) Project Physical Security Plan," recorded videotapes must be stored in a locked cabinet for up to 3 days pending a review by Safeguards and Security. Videotapes must be treated as DOE sensitive unclassified information until the INEEL Classification Office makes a classification determination. MCP-312, "Sensitive Unclassified Information Program," requires sensitive information be stored in a locked desk, cabinet, or room when not in use. TFR Section 3.5.1-3.

3.1.2 Accident Design Criteria

Accident design criteria are listed specifically in the subsections.

3.1.3 Safety-Significant Items

Safety-significant items are discussed below under their respective criteria.

3.1.4 Applicable Regulatory and Contractual Requirements

The following laws, regulations, or contractual requirements are applicable to all facilities, structures, and systems, in addition to those that are listed specifically in the subsections:

- 29 CFR 1910, "Occupational Safety and Health Regulations: (2000)
- 29 CFR 1926, "Safety and Health Regulations for Construction: (2000)
- DOE O 420.1, "Facility Safety" (November 2000)
- DOE-ID "Architectural Engineering Standards" (2001).

3.1.5 Applicable Industry Codes and Standards

To ensure the proper retrieval packaging, transfer, storage, and maintenance of waste zone material, the project design shall comply with the requirements of the currently recognized codes and standards for design as listed in the following subsections. The following industry codes and standards are also applicable:

- NFPA 101, "Life Safety Code" (2000)
- Energy Research and Development Administration (ERDA) Publication 76-21, *Nuclear Air Cleaning Handbook* (1979).

3.2 Power

Normal electrical power for the facility shall be supplied from the 12,470-V overhead power line servicing the RWMC. Power shall be routed to a portable skid consisting of a high voltage fused switch, a 12,470-480Y/277-V transformer, and 600-A distribution panel.

3.2.1 Operational Design Criteria

In addition to the operational design criteria identified for general facilities, the following operational design criteria are specific to power systems:

1. Within the facility, a distribution transformer shall transform the 480 V to 208Y/120. 480Y/277 V and 208Y/120-V systems shall be available.

   Basis: Electrical power from the 12,470-480Y/277-V transformer must be stepped down to standard electrical power system levels. The project is required to use existing utilities, where available, to avoid the cost of new construction, recognizing that additional utility service may be required if the processes and equipment are used for follow-on implementation at a later date. TFR Section 3.1.3-3.

2. The generator will provide power at 480Y/277 V.

   Basis: Compatibility with existing equipment.

3. 480-Vac, three-phase commercial power shall be provided for the drum assay system.

   Basis: The assay system will require 480 Vac, 3 phase power. The design must use existing utilities, where available. The intent of using existing utilities is to be cost effective by minimizing new construction, recognizing that additional utility services may be required if the processes or equipment are used for follow-on implementation. TFR Section 3.1.3-3.

4. The electrical power system shall include provisions for electrical power service to portable storage units.

   Basis: Waste storage alternatives include the possible use of portable storage units. The storage units must utilize existing utility services. The intent of using existing utilities is to be cost-effective by minimizing new construction, recognizing that additional utility services may be required if processes or equipment are used for follow-on implementation. TFR Section 3.1.3-3.

5. The electrical power service for storage units shall be designed such that power remains available to the storage units after D&D&D of the WES.

   Basis: The WES and all its electrical service will be torn down during D&D&D, but the storage area will remain for several years post D&D&D; therefore, the storage should have its own independent power distribution source.

3.2.2 Accident Design Criteria

1. Standby power for the facility shall be provided by a portable standby generator.

   Basis: Per PLN-1024, *Risk Management Plan for the OU 7-10 Glovebox Excavator Method*, a risk exists of work being delayed because of loss of commercial electrical power. As part of reducing the risk, the Risk Management Plan recommends improving system reliability by including a standby diesel generator. Because of the temporary nature of the project, a portable trailer or skid-mounted generator will be implemented.

2. All standby loads in the facility shall be classified as optional standby.

   Basis: During a loss of commercial power scenario, all operators will evacuate the project operations area; therefore, only optional standby status is required. Requirements for optional standby are defined in NFPA 70, "National Electric Code." Self-contained battery-backed units provide emergency power for life safety systems.

3.2.3 Applicable Industry Codes and Standards

The following applicable industry codes and standards apply to the electrical power portions of the facilities and infrastructure system:

NFPA-70, "National Electric Code" (2002).

3.3 Lighting

3.3.1 Operational Design Criteria

In addition to the applicable industry codes and standards listed for the general facilities, the following operational design criteria are specific to the lighting systems:

1. Lighting levels in the facility shall be a minimum of Illuminating Engineering Society of North America (IESNA) 75 ft-candles.

   Basis: Recommended practice by IESNA *Lighting Handbook* (Rea 2000). Adequate lighting is required for safe operations. TFR Section 3.2.6-3.

2. The packaging gloveboxes lighting levels inside the confinement shall be maintained at approximately 100-ft candles or as necessary to allow manual operations.

Basis: "Guidelines for Gloveboxes," Section 5.9.5.1, American Glovebox Society Standard Development Committee. Adequate lighting is required for safe operations. TFR Section 3.2.6-3.

3. Yard lighting shall be provided to support transportation of waste between process areas (i.e., to drum assay or to storage).

   Basis: Current operations plans include operations to occur 24 hours-a-day, 7 days-a-week. Yard lighting is necessary to support safe and effective transportation of packaged waste to the various process areas located outside the WES (e.g., drum assay or storage).

4. Provisions for lighting shall be provided in storage areas to support waste inspection.

   Basis: Lighting is necessary to support safe routine inspection of stored waste.

3.3.2 Accident Design Criteria

1. Emergency power for emergency egress lighting and exit lighting shall be provided by self-contained battery-operated fixtures.

   Basis: NFPA 101, "Life Safety Code." TFR Section 3.2.4-1.

3.3.3 Applicable Industry Codes and Standards

In addition to the applicable industry codes and standards listed for the general facilities, the following are specific to the lighting systems:

- IESNA Standards (Rea 2000)
- American Glovebox Society Standards, Section 5.9.5.1,"Guidelines for Gloveboxes" (1998).

3.4 Heating and Ventilating

3.4.1 Operational Design Criteria

In addition to the operational design criteria identified for general facilities, the following operational design criteria are specific to the heating and ventilating (H&V) systems:

1. The ventilation system shall support an airflow face velocity required for openings of 125 LF/min.

   Basis: DOE-ID "Architectural Engineering Standards" Section 1551-2.3. The project is required to utilize ventilation as part of the confinement system to confine airborne radiological and hazardous materials. DOE-HDBK-1132-99, "Implementation Guide for Use in Developing Documented Safety Analysis to meet Subpart B of 10 CFR 830," a handbook associated with DOE Order 420.1, "Facility Safety," states "The design of a confinement ventilation system ensures the desired airflow at all times and specifically when personnel access doors or hatches are open. When necessary, airlocks or enclosed vestibules may be used to minimize the impact of open doors or hatches on the ventilation system and to prevent the spread of airborne contamination within the facility." TFR Sections 3.1.1.1-5 and 3.1.1.2-3.

2. The ventilation system shall provide for at least 0.5 iwg negative pressure in the confinement structure and gloveboxes.

Basis: DOE-ID "Architectural Engineering Standards" Section 1551-4.2. The project is required to utilize ventilation as part of the confinement system to confine airborne radiological and hazardous materials. DOE-HDBK-1132-99, "Implementation Guide for Use in Developing Documented Safety Analysis to meet Subpart B of 10 CFR 830," a handbook associated with DOE Order 420.1, "Facility Safety," states: "The design of a confinement ventilation system ensures the desired airflow at all times and specifically when personnel access doors or hatches are open. When necessary, airlocks or enclosed vestibules may be used to minimize the impact of open doors or hatches on the ventilation system and to prevent the spread of airborne contamination in the facility." TFR Sections 3.1.1.1-5 and 3.1.1.2-3.

3. The ventilation system shall be designed to maintain a 0.1 iwg negative pressure differential with respect to atmospheric pressure in conditions with wind speeds up to 60 mph.

Basis: The safety analysis does not take credit for nor require this function; however, this is a best management practice and a defense-in-depth feature recommended by DOE-ID to ensure confinement of radiological and hazardous constituents. TFR Sections 3.1.1.1-2 and 3.1.1.1-5.

4. The ventilation system design shall consider the additional air introduced into the RCS by the dust suppression system, and shall ensure an overpressure condition cannot be created by intentional or unintentional discharge of the dust suppression system.

Basis: Good engineering practice.

5. The ventilation system shall be designed to accommodate the functionality of the gloves and other PPE under working ventilation.

Basis: "Guidelines for Gloveboxes," Section 5.9.5.1, American Glovebox Society Standard Development Committee and U.S. Department of Commerce ERDA Publication 76-21, Nuclear Air Cleaning Handbook, October 1979.

6. HEPA filters, housings, configuration, and testing shall be per the DOE-ID "Architectural Engineering Standards."

Basis: DOE-ID "Architectural Engineering Standards," Section 1551, "Special Requirements for Nuclear and Sensitive Duty HVAC."

7. Capability for spot cooling shall be provided for personnel comfort in manned operations areas in the WES.

Basis: *OU 7-10 Glovebox Excavator Method Conceptual Design Report for Critical Decision 1* (CDR) (INEEL 2002c) Section 3.6.1

8. Heating shall be provided as required for equipment, personnel comfort, and freeze protection, as needed. The minimum inside temperature shall be 50°F at -45°outside temperature.

Basis: The project is required to maintain temperatures that allow normal equipment operation inside confinement. Temperature in the facility must not fall below a point where equipment will fail to operate. All equipment will operate satisfactorily if the comfort zone temperatures required by Section 1550 of the DOE-ID "Architectural Engineering Standards are met." TFR Section 3.2.6-4.

9. Backhoe exhaust shall be ventilated to the exterior of the WES via a fan and exhaust ducting.

   Basis: Per the Preliminary Documented Safety Analysis (PDSA), Section 2.5.2.1. Backhoe exhaust must be ventilated to the exterior of the WES to prevent introduction of harmful levels of carbon monoxide. Additionally, active ventilation (i.e., fan-assisted) is recommended by the project's health and safety professional.

10. The backup facility exhaust ventilation system shall be connected to standby power.

    Basis: CDR Section 3.7.4

3.4.2 Accident Design Criteria

In addition to the accident design criteria identified for general facilities, the following accident design criteria are specific to the H&V systems:

1. The design air flow velocity for infiltration into the confinement and glovebox systems shall meet industry requirements for design bases accidents and credible breach conditions.

   Basis: ERDA Publication 76-21, *Nuclear Air Cleaning Handbook*, and "Guidelines for Gloveboxes," Section 5.9.5.1, American Glovebox Society Standard Development Committee.

2. A credible breach is a breach where the H&V can still meet its airflow face velocity requirements and the designer will define its magnitude.

   Basis: DOE-ID "Architectural Engineering Standards" Section 1551-2.3. A credible breach is determined to be a 50 ft^2 based on 125 linear ft/minute face velocity through the breach.

3. The H&V system design shall ensure that during a complete failure of all active systems or a complete loss of power, it will revert to a configuration in which no unfiltered paths exist (passive safe shutdown).

   Basis: PDSA Section 2.6.2

4. The ventilation system shall continue to operate in a normal mode upon breach of confinement to mitigate contamination escaping through the breach.

   Basis: PDSA Section 2.6.2

3.4.3 Safety-Significant Items

Safety-significant SSC are outlined in section 2.2

3.5 Dust Suppression Systems

3.5.1 Operational Design Criteria

In addition to the operational design criteria identified for general facilities, the following operational design criteria are specific to the dust contamination control systems:

1. A commercial fog and spray system shall be provided to control the dust resulting from the excavator dig and dump operations.

   Basis: Dust control must be provided as an integral factor in pollution prevention and waste minimization as they relate to D&D&D and air filter loading. At the same time, the dust control system is an integral factor in providing better visual space and better contamination control as they relate to industrial safety and hygiene. TFR Section 3.1.2.1-7.

3.6 Breathing Air System

3.6.1 Operational Design Criteria

In addition to the operational design criteria identified for general facilities, the following operational design criteria are specific to the breathing air system:

1. Breathing air shall be provided for the RCS.

   Basis: The project must ensure protection of workers in accordance with 29 CFR 1910, Occupational Safety and Health Standards, or equivalent. The project industrial hygienist and safety engineer will perform regular assessments of the work area during operations to ensure compliance with 29 CFR 1910. TFR Section 3.2.4-1.

2. The breathing air system shall be sized to accommodate four workers in bubble suits.

   Basis: The project must ensure protection of workers in accordance with 29 CFR 1910, Occupational Safety and Health Standards, or equivalent. The project industrial hygienist and safety engineer will perform regular assessments of the work area during operations to ensure compliance with 29 CFR 1910. TFR Section 3.2.4-1.

3. The breathing air system shall have a minimum of a 5-minute reserve capacity.

   Basis: The project must ensure protection of workers in accordance with 29 CFR 1910, Occupational Safety and Health Standards, or equivalent. The project industrial hygienist and safety engineer will perform regular assessments of the work area during operations to ensure compliance with 29 CFR 1910. TFR Section 3.2.4-1.

4. Door cutouts shall be provided to accommodate breathing air system routing into the RCS.

   Basis: The project must ensure protection of workers in accordance with 29 CFR 1910, Occupational Safety and Health Standards, or equivalent. The project industrial hygienist and safety engineer will perform regular assessments of the work area during operations to ensure compliance with 29 CFR 1910. TFR Section 3.2.4-1.

4. REFERENCES

10 CFR 830, 2002, Title 10, "Energy," Part 830, "Nuclear Safety Management," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910, 2002, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926, 2002 "Safety and Health Regulations for Construction," *Code of Federal Regulations*, Office of the Federal Register.

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code.*

AGS, 1998, "Guidelines for Gloveboxes," American Glovebox Society Development Committee.

Beitel, G. A., 2002*, OU 7-10 Chemical Compatibility of Glovebox Excavator Method Project Materials*, Engineering Design File EDF-2041, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

Burton, Brent N., 2002, *OU 7-10 Glovebox Excavator Method Project Storage Requirements and Approach*, EDF-3032, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, February 28, 2002.

Davies, Steven A., 2002, "Occupancy and Life Safety Code Analysis," EDF-2082, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

DOE O 420.1, 2000, "Facility Safety," U.S. Department of Energy, November 22, 2000.

DOE-HDBK-1132-99, 2001, "Implementation Guide for Use in Developing Documented Safety Analysis to Meet Subpart B of 10 CFR 830," U.S. Department of Energy, October 24, 2001.

DOE-ID, 2000, "Architectural Engineering Standards," Rev. 27, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho,
URL: http://www.inel.gov/publicdocuments/doe/archeng-standards/default.shtml

DOE-ID, 1998, *Explanation of Significant Differences for the Pit 9 Interim Action Record of Decision at the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory,* Administrative Record No. 10537, U.S. Department of Energy, Idaho Operations Office; U.S. Environmental Protection Agency, Region 10; and Idaho Department of Health and Welfare, 1998.

DOE-ID, 1993, *Record of Decision: Declaration of Pit 9 at the Radioactive Waste Management Complex Subsurface Disposal Area at the Idaho National Engineering Laboratory, Idaho Falls, Idaho*, U.S. Department of Energy, Idaho Field Office; U.S. Environmental Protection Agency, Region 10; Idaho Department of Health and Welfare.

DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory*, Administrative Record No. 1088-06-29-120, U.S. Department of Energy, Idaho Field Office; U.S. Environmental Protection Agency, Region 10; Idaho Department of Health and Welfare, December 4, 1991.

DOE-STD-027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," Change 1, U.S. Department of Energy, September 1997.

ERDA, 1979, *Nuclear Air Cleaning Handbook*, Publication 76-21, U.S. Department of Comerce Energy Research and Development Administration, October 1979.

Gosswiller, Eric B., 2002, *Fire Hazards Analysis for the OU 7-10 Glovebox Excavator Method*, INEEL/EXT-01-01680, Rev. 1, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

Huntley, R. M., and D. E. Burns, 1995, *Scope of Work for Operable Unit 7-13/14 Waste Area Group 7 Comprehensive Remedial Investigation/Feasibility Study*, INEL-95/0253, Idaho National Engineering and Environmental Laboratory, Lockheed Martin Idaho Technologies Company, Idaho Falls, Idaho.

ICC, 2000, *2000 International Building Code*, ISBN 1892395266, International Code Council, Falls Church, Virginia.

INEEL, 2002a, *OU 7-10 Glovebox Excavator Method Technical and Functional Requirements*, INEEL/EXT-1998-00444, TFR-2527, Rev. 3, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

INEEL, 2002b, *Documented Safety Analysis for the OU 7-10 Glovebox Excavator Method Project*, INEEL/EXT-01-01474, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

INEEL, 2002c, *OU 7-10 Glovebox Excavator Method Project Conceptual Design Report for Critical Decision 1*, INEEL/EXT-01-01512, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

INEEL, 2001, *Waste Area Group 7 Analysis of OU 7-10 Stage II Modifications*, INEEL/EXT-01-01105, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

LMITCO, 1997, *Remedial Design/Remedial Action Scope of Work and Remedial Design Work Plan: Operable Unit OU 7-10 (Pit 9 Project Interim Action)*, INEL-94/0110 (formerly EGG-ER-11055), Rev. 2, Idaho National Engineering and Environmental Laboratory, Lockheed Martin Idaho Technologies Company, Idaho Falls, Idaho.

MCP-303, 2000, "INEEL Access Controls," Rev. 4, June 27, 2000.

MCP-312, 2001, "Sensitive Unclassified Information Program," Rev. 8, October 15, 2001.

NFPA, 2000, "Life Safety Code," NFPA 101, National Fire Protection Association.

NFPA, 1998, "Fire Protection for Facilities Handling Radioactive Materials," NFPA 801, National Fire Protection Association.

NFPA, 2002, "National Electrical Code," NFPA 70, National Fire Protection Association.

O'Holleran, Thomas P., Argonne National Laboratory – West, 2000, *OU 7-10 Materials Compatibility Study for Stage I and Stage II Enclosures*, INEEL/EXT-2000-00926, Engineering Design File EDF-ER-211, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

PLN-1024, 2002, *Risk Management Plan for the OU 7-10 Glovebox Excavator Method Project*, Rev. 0, April 2002.

PLN-632, "OU 7-10 Staged Interim Action Project Physical Security Plan," Rev. 1, April 23, 2001.

Rea, Mark S., 2000, *Lighting Handbook,* ISBN: 879951508, 9th ed., Illuminating Engineering Society of North America.

Walsh, Stephanie, 2002, "Process Calculations," EDF-3125, Rev. 0, May 23, 2002.

Appendix A

Ventilation System Critical Attributes List

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Ventilation System Critical Attributes List

Table A-1. Development of quality assurance requirements for the heating and ventilating system.

System, Structures, or Components	Safety Function	Technical and Functional Requirement	Critical Characteristic	Supporting Technical and Functional Requirement	Specification	Method of Verification
H&V System	Confinement of radioactive contamination and hazardous materials	3.1.1.1-2. The project shall provide a confinement for radiological and hazardous materials.	Maintain negative pressures	Same as general requirement	RCS –0.5 iwg w.r.t. personnel access, -0.6 iwg w.r.t. WES.	Differential pressure measurements
			Ability to resist design loads	Same as general requirement	Design maximum load of –4 iwg w.r.t. WES.	Analysis and design verification (MCP-9217[a])
			Ability to survive DBE	3.2.5-1 Resist natural phenomena	IBC earthquake criteria with I = 1.5, DOE PC-2	Analysis and design verification (MCP-9217[a])

DBE = design-basis earthquake
DOE = U.S. Department of Energy
H&V = heating and ventilating
IBC = *International Building Code*
MCP = management control procedure
PC = performance category
WES = Weather Enclosure Structure

a. MCP-9217, 2002, "Design Verification," Rev. 1, November 1, 2001.

Table A-2. Heating and ventilating system component information for the Retrieval Confinement Structure.

Retrieval Confinement Structure Component	Safety Function	Applicable Performance Category-2 Criteria	Critical Characteristics	Supporting Documents	Method of Verification
RCS inlet air HEPA filter system.	Confine materials	PC-2 earthquake loading	System design	Vendor data	Certificate of conformance to requirements
RCS inlet air ductwork	Confine materials	PC-2 earthquake loading	System design	EDF	Analysis and design verification.
PGS loadout tent HEPA filter system.	Confine materials	PC-2 earthquake loading	System design.	Vendor data	Certificate of conformance to requirements.
PGS Inlet HEPA filter system	Confine materials	PC-2 earthquake loading	System design	Vendor data	Certificate of conformance to requirements.
PGS Inlet air ductwork	Confine materials	PC-2 earthquake loading	System design	EDF	Analysis and design verification.
PGS loadout tent inlet exhaust HEPA filter	Confine materials	PC-2 earthquake loading	System design	EDF	Analysis and design verification.
PGS loadout tent exhaust ductwork	Confine materials	PC-2 earthquake loading	System design	EDF	Analysis and design verification
RCS exhaust ductwork to HEPA filter system	Confine materials	PC-2 earthquake loading	System design	EDF	Analysis and design verification.
Main exhaust filter bank	Confine materials	PC-2 earthquake loading	System design	Vendor data	Analysis and design verification.

EDF = engineering design file HEPA = high-efficiency particulate air PC = performance category PGS = Packaging Glovebox System RCS = Retrieval Confinement Structure